

PATENT APPLICATION OF
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FOR
CONTAINER WITH PUSH-PULL OPENING MEANS

BACKGROUND-FIELD OF INVENTION

[0001] The present invention relates generally to a sealed container with an opening means enclosed within the container for releasing a fluid enclosed within the container.

BACKGROUND-DESCRIPTION OF RELATED ART

[0002] A variety of opening means exists for opening a container. Most opening means are in the form of a screw-on cap or a snap-on cap. Some opening means are in the form of a frangible seal or a score line on the container that will allow the contents of the container to be released upon fracturing of the frangible seal or the container at the score line. All of these opening means are either attached to the container externally, such as the screw-on cap and the snap-on cap, or are formed as part of the container, such as the frangible seal and the score line on the

container. None of the opening means are designed to be enclosed within the container to seal a liquid in the container and yet still allow the release of the liquids easily and reliably. The availability of an effective and easy to use opening means is particularly lacking for a small elongated container with a small cross-sectional area.

BRIEF SUMMARY OF THE INVENTION

[0003] A container with push-pull opening means comprising an axially extendable and compressible elongated housing enclosing a fluid therein and with an enclosed opening means therein sealing the fluid in the elongated housing. The enclosed opening means is operated by stretching or compressing the elongated housing to open and close the enclosed opening means. In the preferred embodiment, the enclosed opening means comprises of a hollow tube with an applicator tip affixed to one end and an operable plug at the other end sealing one or more fluid flow path from the fluid within the elongated housing to the applicator tip.

BRIEF DESCRIPTION OF THE DRAWINGS

[0004] Figure 1 shows the preferred embodiment of the container with push-pull opening means in the closed position.

[0005] Figure 2 shows another embodiment of the container with push-pull opening means.

[0006] Figure 3 shows the preferred embodiment of the container with push-pull opening means in the open position after the elongated housing is stretched axially.

[0007] Figure 4 shows the preferred embodiment of the container with push-pull opening means in the open position after the elongated housing is compressed axially.

[0008] Figure 5 shows another embodiment of the container with push-pull opening means.

- [0009] Figure 6 shows another embodiment of the container with push-pull opening means.
- [0010] Figure 7 shows another embodiment of the container with push-pull opening means.
- [0011] Figure 8 shows another embodiment of the container with push-pull opening means.
- [0012] Figure 9 shows another embodiment of the container with push-pull opening means.
- [0013] Figure 10 shows another embodiment of the container with push-pull opening means.
- [0014] Figure 11 shows another embodiment of the container with push-pull opening means.
- [0015] Figure 12 shows another embodiment of the container with push-pull opening means.
- [0016] Figure 13 shows another embodiment of the container with push-pull opening means.
- [0017] Figure 14 shows another embodiment of the container with push-pull opening means.
- [0018] Figure 15 shows another embodiment of the container with push-pull opening means.
- [0019] Figure 16 shows another embodiment of the container with push-pull opening means.
- [0020] Figure 17 shows another embodiment of the container with push-pull opening means.
- [0021] Figure 18 shows another embodiment of the container with push-pull opening means.
- [0022] Figure 19 shows another embodiment of the container with push-pull opening means.
- [0023] Figure 20 shows another embodiment of the container with push-pull opening means.
- [0024] Figure 21 shows another embodiment of the container with push-pull opening means.
- [0025] Figure 22 shows another embodiment of the container with push-pull opening means.
- [0026] Figure 23 shows another embodiment of the container with push-pull opening means.
- [0027] Figure 24 shows another embodiment of the container with push-pull opening means.
- [0028] Figure 25 shows another embodiment of the container with push-pull opening means.
- [0029] Figure 26 shows another embodiment of the container with push-pull opening means.
- [0030] Figure 27 shows another embodiment of the container with push-pull opening means.
- [0031] Figure 28 shows another embodiment of the container with push-pull opening means.

- [0032] Figure 29 shows another embodiment of the container with push-pull opening means.
- [0033] Figure 30 shows another embodiment of the container with push-pull opening means.
- [0034] Figure 31 shows another embodiment of the container with push-pull opening means.
- [0035] Figure 32 shows another embodiment of the container with push-pull opening means.
- [0036] Figure 33 shows another embodiment of the container with push-pull opening means.
- [0037] Figure 34 shows another embodiment of the container with push-pull opening means.
- [0038] Figure 35 shows another embodiment of the container with push-pull opening means.
- [0039] Figure 36 shows another embodiment of the container with push-pull opening means.
- [0040] Figure 37 shows another embodiment of the container with push-pull opening means.
- [0041] Figure 38 shows another embodiment of the container with push-pull opening means.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

- [0042] The following description and figures are meant to be illustrative only and not limiting. Other embodiments of this invention will be apparent to those of ordinary skill in the art in view of this description.
- [0043] Figures 1, 2, 3, and 4 show the current preferred embodiment of the present invention. In the preferred embodiment, the container with push-pull opening means comprises of an elongated tubular housing 1 with a bellow section 2 between its two ends that can be stretched and compressed by pulling or pushing the elongated tubular housing 1 on either side of the bellow section 2. A fluid 3 is disposed inside the elongated tubular housing 1. One end of the elongated tubular housing is sealed and a hollow tube 4 with a sealed end and an open end is affixed at the other end of the elongated tubular housing 1 with the sealed end inside the elongated tubular housing 1. An applicator tip 5 such as a cotton swab or a foam material may

be affixed to the open end of the hollow tube 4. An opening 6 such as a hole is formed on the cylindrical surface near the sealed end of the hollow tube 4. A sealing plug 7 in the form similar to an o-ring is disposed around the hollow tube 4 sealing the opening 6. The bellow section 2 is positioned between the sealing plug 7 and the open end of the hollow tube 4. In one embodiment, the sealing plug 7 may be slidable inside the elongated tubular housing 1 along the length of the hollow tube 4, opening and closing the opening 6 on the hollow tube 4, by squeezing the elongated tubular housing 1 at the position of the sealing plug 7 thereby affix the position of the sealing plug 7 relative to the elongated tubular housing 1 and pulling or pushing the elongated tubular housing 1 on either side of the bellow section 2. In another embodiment, the sealing plug 7 may be affixed to the elongated tubular housing 1 and slidable along the hollow tube 4 when the elongated tubular housing 1 is stretched or compressed.

[0044] As shown in figure 3, when the elongated tubular housing 1 is stretched, the hollow tube 4 will be pulled away from the sealing plug 7 thereby exposing the opening 6 near its sealed end. The fluid 3 enclosed within the elongated tubular housing 1 is then released through the resulting opening in the sealing plug 7, into the opening 6 in the hollow tube 4, and out through the hollow tube 4 into the applicator tip 5 by squeezing the elongated tubular housing 1. The opening means may also be operated by compressing the bellow section 2 as shown in figure 4, wherein the sealed end of the hollow tube 4 will be urged towards the fluid 3 and the opening 6 near the sealed end will be exposed. The fluid 3 enclosed within the elongated tubular housing 1 is then released through the opening 6 near the sealed end of the hollow tube 4 and through the hollow tube 4 into the applicator tip 5 by squeezing the elongated tubular housing 1.

[0045] Figure 2 shows a variation of the preferred embodiment of the present invention. In this embodiment, the opening 6 in the hollow tube 4 is positioned away from the sealed end of

the hollow tube 4 wherein the opening 6 is positioned away from the sealing plug 7 and opposite of the fluid 3 in the elongated tubular housing 1. In this embodiment, when the elongated tubular housing 1 is stretched, the hollow tube 4 will be pulled away from the sealing plug 7 thereby exposing the opening 6 to the fluid 3. The fluid 3 enclosed within the elongated tubular housing 1 is then released through the resulting opening in the sealing plug 7, into the opening 6 in the hollow tube 4, and out through the hollow tube 4 into the applicator tip 5.

[0046] In another embodiment, the sealed end of the hollow tube 4 has an enlarged section 8 that is greater than the opening in the sealing plug 7 as shown in figure 5. In this configuration, when the elongated tubular housing 1 is compressed, the sealed end of the hollow tube 4 will be urged towards the fluid 3 and the opening 6 near the sealed end will be exposed. The fluid 3 enclosed within the elongated tubular housing 1 is then released through the opening 6 near the sealed end of the hollow tube 4 and through the hollow tube 4 into the applicator tip 5 by squeezing the elongated tubular housing 1. When the elongated tubular housing 1 is stretched back to its initial position, the enlarged section 8 at the sealed end of the hollow tube 4 will stop the travel of the hollow tube 4 at a position that enable the sealing plug 7 to positively re-seal the opening 6 on the hollow tube 4 thereby allow repeated opening and closing of the container.

[0047] Figure 6 shows another embodiment of the container with push-pull opening means. In this embodiment, the sealing plug 9 is in the form of a cup or a short section of a tube with a sealed end and an open end. The sealing plug 9 is removably affixed to the sealed end of the hollow tube 4 sealing the opening 6 near the sealed end of the hollow tube 4. In one embodiment, the sealing plug 9 has a smaller outside diameter than the inside diameter of the elongated tubular housing 1. The sealing plug 9 is removed by squeezing the elongated tubular housing 1 at the position of the sealing plug 9 thereby affix the position of the sealing plug 9

relative to the elongated tubular housing **1** and pulling the elongated tubular housing **1** on either side of the bellow section **2**. In another embodiment, the sealing plug **9** may be affixed to the wall of the elongated tubular housing **1** and provided with fluid flow path from one side of the sealing plug **9** to the other side such as that shown in figure 8. When the elongated tubular housing **1** is stretched, the hollow tube **4** will be pulled away from the sealing plug **9** thereby exposing the opening **6** near its sealed end. The fluid **3** enclosed within the elongated tubular housing **1** is then released through the opening **6** in the hollow tube **4** and out through the hollow tube **4** into the applicator tip **5** by squeezing the elongated tubular housing **1**.

[0048] The embodiment shown in figure 6 may also be provided with a snap-open safety feature wherein the sealing plug **9** is provided with a fracture line on the wall of the sealing plug **9** positioned above the opening **6** near the sealed end of the hollow tube **4** when the sealing plug **9** is placed over the sealed end of the hollow tube **4**. The open end of the sealing plug **9** is affixed to the hollow tube **4** above the fracture line. In this configuration, the sealing plug **9** cannot be pulled away from the hollow tube **4** by accident. The elongated tubular housing **1** must first be bent at the fracture line on the sealing plug **9** to separate the sealing plug **9** at the fracture line into two portions, a top portion that is affixed to the hollow tube **4** and a bottom portion that seals the opening **6** near the sealed end of the hollow tube **4**. The bottom portion may then be pulled away from the hollow tube **4** to expose the opening **6** near the sealed end and allow the fluid **3** to be released through the opening **6**.

[0049] Another embodiment of the container with push-pull opening means is shown in figure 7. In this embodiment, the container with push-pull opening means comprises of an elongated tubular housing **1** with a bellow section **2** between its two ends that can be stretched and compressed by pulling or pushing the elongated tubular housing **1** on either side of the bellow

section 2. A fluid 3 is disposed inside the elongated tubular housing 1. One end of the elongated tubular housing 1 is sealed and a hollow tube 10 is affixed at the other end of the elongated tubular housing 1 with an applicator tip 5 such as a cotton swab or a foam material affixed to the end of the hollow tube 10 outside of the elongated tubular housing 1. The sealing plug 9 is in the form of a cup or a short section of a tube with a sealed end and an open end. The sealing plug 9 is removably affixed to the end of the hollow tube 10 enclosed in the elongated tubular housing 1 thereby sealing the open end. In one embodiment, the sealing plug 9 has a smaller outside diameter than the inside diameter of the elongated tubular housing 1. The sealing plug 9 is removed by squeezing the elongated tubular housing 1 at the position of the sealing plug 9 thereby affix the position of the sealing plug 9 relative to the elongated tubular housing 1 and then pulling the elongated tubular housing 1 on either side of the bellow section 2. In another embodiment, the sealing plug 12 may be affixed to the wall of the elongated tubular housing 1 and provided with fluid flow path from one side of the sealing plug 12 to the other side such as that shown in figure 8. When the elongated tubular housing 1 is stretched, the hollow tube 10 will be pulled away from the sealing plug 12 thereby exposing its open end. The fluid 3 enclosed within the elongated tubular housing 1 is then released through the open end of the hollow tube 10 and out through the hollow tube 10 into the applicator tip 5 by squeezing the elongated tubular housing 1.

[0050] The embodiment shown in figure 7 may also be provided with a snap-open safety feature wherein the sealing plug 9 is provided with a fracture line 11 on the wall of the sealing plug 9 positioned above the open end of the hollow tube 10 when the sealing plug 9 is placed over the open end of the hollow tube 10. The open end of the sealing plug 9 is affixed to the hollow tube 10 above the fracture line 11. In this configuration, the sealing plug 9 cannot be

pulled away from the hollow tube **10** by accident. The elongated tubular housing **1** must first be bent at the fracture line **11** on the sealing plug **9** to separate the sealing plug **9** at the fracture line **11** into two portions, a top portion that is affixed to the hollow tube **10** and a bottom portion that seals the open end of the hollow tube **10**. The bottom portion may then be pulled away from the hollow tube **10** to expose the open end and allow the fluid **3** to be released through the open end of the hollow tube **10**.

[0051] Figure 9 shows another embodiment of the container with push-pull opening means. In this embodiment, the container with push-pull opening means comprises of an elongated tubular housing **1** with a bellow section **2** between its two ends that can be stretched and compressed by pulling or pushing the elongated tubular housing **1** on either side of the bellow section **2**. A fluid **3** is disposed inside the elongated tubular housing **1**. One end of the elongated tubular housing **1** is sealed and a hollow tube **10** is affixed at the other end of the elongated tubular housing **1** with an applicator tip **5** such as a cotton swab or a foam material affixed to the end of the hollow tube **10** outside of the elongated tubular housing **1**. The sealing plug **13** is in the form of a cup or a short section of a tube with a sealed end and an open end. An opening **14** is provided on the wall of the sealing plug **13** near the sealed end. The sealing plug **13** is removably affixed to the end of the hollow tube **10** sealing the open end of the hollow tube **10**. In one embodiment, the sealing plug **13** has a smaller outside diameter than the inside diameter of the elongated tubular housing **1**. The sealing plug **13** is urged to slide away from the open end of the hollow tube **10** by squeezing the elongated tubular housing **1** at the position of the sealing plug **13** thereby affix the position of the sealing plug **13** relative to the elongated tubular housing **1** and pulling the elongated tubular housing **1** on either side of the bellow section **2**. When the opening **14** in the wall of the sealing plug **13** slides past the end of the hollow tube **10**, a fluid flow path is exposed

and the fluid **3** within the elongated tubular housing **1** may be released. The sealing plug **13** may remain at the end of the hollow tube **10** without obstructing the fluid flow path.

[0052] The embodiment shown in figure 9 may also be provided with a snap-open safety feature wherein the hollow tube **10** is provided with a fracture line on the wall of the hollow tube **10** positioned above the open end of the hollow tube **10** with the end of the hollow tube **10** affixed to the sealing plug **13**. In this configuration, the sealing plug **13** cannot be pulled away from the hollow tube **10** by accident. The elongated tubular housing **1** must first be bent at the fracture line on the hollow tube **10** to separate the end of the hollow tube **10** that is affixed to the sealing plug **13** from the remainder of the hollow tube **10**. The sealing plug **13** may then be pulled away from the hollow tube **10** to expose a fluid flow path through the opening **14** in the sealing plug **13** through the fractured open end of the hollow tube **10** and allow the fluid **3** to be released.

[0053] Figure 10 shows another embodiment of the container with push-pull opening means. In this embodiment, the container with push-pull opening means comprises of an elongated tubular housing **1** with a bellow section **2** between its two ends that can be stretched and compressed by pulling or pushing the elongated tubular housing **1** on either side of the bellow section **2**. A fluid **3** is disposed inside the elongated tubular housing **1**. One end of the elongated tubular housing **1** is sealed and a hollow tube **10** is affixed at the other end of the elongated tubular housing **1** with an applicator tip **5** such as a cotton swab or a foam material affixed to the end of the hollow tube **10** outside of the elongated tubular housing **1**. The sealing plug **9** is in the form of a cup or a short section of a tube with a sealed end and an open end. The sealing plug **9** is removably affixed to the open end of the hollow tube **10** sealing the end of the hollow tube **10**. The sealing plug **9** has a smaller outside diameter than the inside diameter of the elongated

tubular housing 1. A restriction 15 is affixed to the elongated tubular housing 1 above the sealing plug 9 wherein the sealing plug 9 is removed by simply pulling the elongated tubular housing 1 on either side of the bellow section 2. The sealing plug 9 will be pulled away from the open end of the hollow tube 10 due to the resistance of the restriction 15 affixed to the elongated tubular housing 1 thereby exposing the open end of the hollow tube 10. The fluid 3 enclosed within the elongated tubular housing 1 is then released through the open end of the hollow tube 10 and out through the hollow tube 10 into the applicator tip 5 by squeezing the elongated tubular housing 1.

[0054] Figure 11 shows another embodiment of the container with push-pull opening means. In this embodiment, the sealing plug 16 is provided with a protrusion 17 with approximately the same outside diameter as the inside diameter of the hollow tube 10. The protrusion 17 on the sealing plug 16 is inserted into the open end of the hollow tube 10 thereby sealing the end of the hollow tube 10. When the sealing plug 16 is removed from the end of the hollow tube 10 by pulling the elongated tubular housing 1 as disclosed herein, a fluid flow path is exposed through the open end of the hollow tube 10.

[0055] Figure 12 shows a variation of the container with push-pull opening means shown in figure 11. In this embodiment, the body of the sealing plug 18 is affixed to the elongated tubular housing 1 and provided with fluid flow path 19 from one side of the sealing plug 18 to the other side. When the elongated tubular housing 1 is stretched, the hollow tube 10 will be pulled away from the sealing plug 18 thereby exposing its open end. The fluid 3 enclosed within the elongated tubular housing 1 is then released through the open end of the hollow tube 10 and out through the hollow tube 10 into the applicator tip 5 by squeezing the elongated tubular housing 1.

[0056] Figure 13 shows another embodiment of the container with push-pull opening means. In this embodiment, the sealing plug **20** is in the form of a cup or a short section of a tube with a sealed end and an open end wherein the open end has approximately the same inside diameter as the outside diameter of the hollow tube **10**. An opening **21** is provided on the wall of the sealing plug **20** that is obstructed by the hollow tube **10** when the sealing plug **20** is placed over the end of the hollow tube **10**. In the center of the sealing plug **20** is a protrusion **22** with approximately the same outside diameter as the inside diameter of the hollow tube **10** and is shorter than the wall of the sealing plug **20**. When the sealing plug **20** is pulled away from the hollow tube **10**, the opening **21** in the wall of the sealing plug **20** and the open end of the hollow tube **10** will form a fluid flow path for the fluid **3** in the elongated tubular housing **1** to be released. The sealing plug **20** may remain at the end of the hollow tube **10** without obstructing the fluid flow path.

[0057] Figure 14 shows another embodiment of the container with push-pull opening means. In this embodiment, the sealing plug **16** is provided with a protrusion **17** with approximately the same outside diameter as the inside diameter of the hollow tube **10**. The protrusion **17** on the sealing plug **16** is inserted into the open end of the hollow tube **10** thereby sealing the end of the hollow tube **10**. The body of the sealing plug **16** has a smaller outside diameter than the inside diameter of the elongated tubular housing **1**. A restriction **23** is affixed to the elongated tubular housing **1** above the sealing plug **16** wherein the sealing plug **16** is removed by simply pulling the elongated tubular housing **1** on either side of the bellow section **2**. The sealing plug **16** will be pulled away from the open end of the hollow tube **10** due to the resistance of the restriction **23** affixed to the elongated tubular housing **1** thereby exposing the open end of the hollow tube **10**. The fluid **3** enclosed within the elongated tubular housing **1** is then released through the open end

of the hollow tube **10** and out through the hollow tube **10** into the applicator tip **5** by squeezing the elongated tubular housing **1**.

[0058] The embodiment shown in figure 12 may also be provided with a snap-open safety feature as shown in figure 15 wherein the hollow tube **10** is provided with a fracture line **24** positioned at the protrusion of the sealing plug **18** when the protrusion is inserted into the hollow tube **10**. The open end of the hollow tube **10** is affixed to the body of the sealing plug **18** at a position below the fracture line **24**. In this configuration, the sealing plug **18** cannot be pulled away from the hollow tube **10** by accident. The elongated tubular housing **1** must first be bent at the fracture line **24** on the hollow tube **10** to separate the hollow tube **10** and the sealing plug **18** at the fracture line **24**. The sealing plug **18** may then be pulled away from the hollow tube **10** to expose the open end of the hollow tube **10** and to allow the fluid **3** to be released through the opening. In a variation of this embodiment, the body of the sealing plug **18** may be affixed to the elongated tubular housing **1** and provided with fluid flow path **19** from one side of the sealing plug **18** to the other side.

[0059] Another embodiment of the container with push-pull opening means is shown in figures 16 and 17. In this embodiment, the sealing plug **25** has a hollow body with a sealed end and an open end. An opening **26** is disposed near the sealed end of the sealing plug **25**. The sealing plug **25** is inserted with its sealed end into the hollow tube **10**. The opening **26** near the sealed end of the sealing plug **25** may be inside the hollow tube **10** as shown in figure 16 or outside of the hollow tube **10** as shown in figure 17. When the elongated tubular housing **1** is stretched, the hollow tube **10** will be pulled away from the sealing plug **25** thereby exposing its open end. The fluid **3** enclosed within the elongated tubular housing **1** is then released through the opening **26** near the end of the sealing plug **25**, through the open end of the hollow tube **10**,

and out through the hollow tube **10** into the applicator tip **5** by squeezing the elongated tubular housing **1**.

[0060] Another embodiment of the container with push-pull opening means is shown in figure 18. In this embodiment, the sealing plug **27** is disposed at a restriction **28** in the elongated tubular housing **1**. The restriction **28** has an opening approximately that of the outside diameter of the hollow tube **10**. The sealing plug **27** has approximately the same diameter as the outside diameter of the hollow tube **10**. The open end of the hollow tube **10** is inserted into one end of the restriction **28** in the elongated tubular housing **1** with the sealing plug **27** sealing the fluid flow path through the other end of the restriction **28**. When the elongated tubular housing **1** is compressed, the hollow tube **10** will be urged against the sealing plug **27** and push the sealing plug **27** out of the restriction **28** in the elongated tubular housing **1** thereby exposing a fluid flow path through the restriction **28** and the open end of the hollow tube **10**. The fluid **3** enclosed within the elongated tubular housing **1** is then released through the restriction **28**, through the open end of the hollow tube **10**, and out through the hollow tube **10** into the applicator tip **5** by squeezing the elongated tubular housing **1**.

[0061] Figure 19 shows another embodiment of the container with push-pull opening means. In this embodiment, the sealing plug **27** is disposed within a cylinder **30** with a sealed end and an open end. The cylinder **30** has a smaller outside diameter than the inside diameter of the elongated tubular housing **1**. Multiple openings **31** are formed in the cylindrical walls near the sealed end of the cylinder **30** positioned between the sealing plug **27** and the sealed end of the cylinder **30**. The open end of the cylinder **30** is affixed to and sealed with its outside surface against the elongated tubular housing **1** sealing the fluid **3** near the sealed end of the elongated tubular housing **1**. The open end of the hollow tube **29** is formed at an angle such as by cutting

the end of the open end at an angle. The open end with the angle is inserted into the cylinder **30** to just above the sealing plug **27**. When the elongated tubular housing **1** is compressed, the open end of the hollow tube **29** with the angle will urge the sealing plug **27** past the openings **31** in the cylindrical walls thereby exposing a fluid flow path. The fluid **3** enclosed within the elongated tubular housing **1** is then released through the openings **31** in the cylindrical walls through the open end of the hollow tube **29**, and out through the hollow tube **29** into the applicator tip **5** by squeezing the elongated tubular housing **1**.

[0062] Figure 20 shows another embodiment of the container with push-pull opening means. In this embodiment, a tubular member **32** with one end affixed to and sealed by the sealed end of the elongated tubular housing **1** is disposed inside the elongated tubular housing **1**. The tubular member **32** extends to, overlaps, and seals against the open end of the hollow tube **10**. The inside diameter of the tubular member **32** at the overlap is approximately that of the outside diameter of the hollow tube **10**. A fluid **3** is sealed between the outside wall of the hollow member **32**/hollow tube **10** and the inside wall of the elongated tubular housing **1**. When the elongated tubular housing **1** is stretched, the tubular member **32** and the hollow tube **10** will separate and the seal between them is broken. The fluid **3** will then be released through the resulting opening at the open end of the hollow tube **10**.

[0063] Figure 21 shows another embodiment of the container with push-pull opening means. In this embodiment, a tubular member **33** with one end affixed to the sealed end of the elongated tubular housing **1** is disposed inside the elongated tubular housing **1**. An opening **34** is provided on the wall of the tubular member **33** near the sealed end of the elongated tubular housing **1**. The tubular member **33** extends to, overlaps, and seals against a sealed end of the hollow tube **4**. An opening **6** is provided in the cylindrical wall of the hollow tube **4** near the sealed end. The inside

diameter of the tubular member 33 at the overlap is approximately that of the outside diameter of the hollow tube 4. When the elongated tubular housing 1 is stretched, the tubular member 33 and the hollow tube 4 will separate and the seal between them will be broken. The fluid 3 will then be released through the opening 6 in the cylindrical wall near the sealed end of the hollow tube 4.

[0064] Figure 22 shows another embodiment of the container with push-pull opening means. In this embodiment, the opening means comprises a first elongated hollow tube 36 with two ends wherein one end has a smaller diameter than the remainder of the first elongated hollow tube 36. A second elongated hollow tube 35 with two ends wherein one end has a larger diameter than the remainder of the second elongated hollow tube 35 and also larger than the diameter of the end of the first elongated hollow tube 36 with the smaller diameter slidably engaged to the first elongated hollow tube 36 on a common axis with the larger diameter of the second elongated hollow tube 35 disposed inside the smaller diameter end of the first elongated hollow tube 36. The two elongated hollow tubes 35, 36 will form a seal at their interface as shown in figure 22. A fluid 3 is sealed between the outside walls of the two elongated hollow tubes 35, 36 and the inside wall of the elongated tubular housing 1. In this configuration when the elongated tubular housing 1 is compressed the seal at the interface between the two elongated hollow tubes 35, 36 will be broken. The fluid 3 enclosed within the elongated tubular housing 1 is then released through the second elongated hollow tube 35 into the applicator tip 5 by squeezing the elongated tubular housing 1.

[0065] Figure 23 shows another embodiment of the container with push-pull opening means. In this embodiment, a sealing plug 37 is affixed to the end of an elongated member 38. The sealing plug 37 may also be formed as an integral part of the end of an elongated member 38.

The other end of the elongated member **38** is affixed to the sealed end of the elongated tubular housing **1**. The sealing plug **37** is disposed at a restriction **39** inside the elongated tubular housing **1** thereby sealing the fluid **3** within the elongated tubular housing **1** near the sealed end. When the elongated tubular housing **1** is stretched at the bellow section **2**, the sealing plug **37** will be pulled away from the restriction **39** thereby opening a fluid flow path from the fluid **3** to the hollow tube **10** at the other end of the elongated tubular housing **1**. The fluid **3** enclosed within the elongated tubular housing **1** is then released through the hollow tube **10** and into the applicator tip **5** by squeezing the elongated tubular housing **1**.

[0066] Figure 24 shows another embodiment of the container with push-pull opening means. In this embodiment, the sealing plug **40** is an elongated member with approximately the same outside diameter as the inside diameter of the hollow tube **10**. One end **41** of the elongated member is formed with a profile such that when that end of the elongated member is inserted into the hollow tube **10** it will not seal the fluid flow path from the fluid **3** through the hollow tube **10**. The non-sealing end **41** may have a square, triangular, or any other geometric profile other than a circle with approximately the same diameter as the inside diameter of the hollow tube **10**. The elongated member is inserted with the non-sealing end **41** and a short length of the sealing portion with approximately the same outside diameter as the inside diameter of the hollow tube **10** inside the hollow tube **10**. A length of the elongated member extends outside of the hollow tube such that it may be grasped by squeezing the elongated tubular housing **1** at the position of the elongated member that extends outside of the hollow tube **10** thereby affix the position of the elongated member relative to the elongated tubular housing **1** and pulling the elongated tubular housing **1** on either side of the bellow section **2**. When the elongated member is partially pulled out of the hollow tube **10** such that the non-sealing end is exposed to the fluid

3, a fluid flow path is exposed to allow the fluid 3 to be released from the elongated tubular housing 1. The non-sealing end will remain in the hollow tube 10 thereby retain the elongated member at the end of the hollow tube 10.

[0067] Figure 25 shows another application of the embodiment of the container with push-pull opening means shown in figure 24. The structure shown in figure 24 is inverted and affixed within the elongated tubular housing 1 with the hollow tube 10 sealing against the inside wall of the elongated tubular housing 1 to seal the fluid 3 within the elongated tubular housing 1. When the elongated member is partially pulled out of the hollow tube 10 such that the non-sealing end is exposed outside of the hollow tube 10, a fluid flow path is exposed to allow the fluid 3 to be released from the elongated tubular housing 1. The non-sealing end 41 will remain in the hollow tube 10 thereby retain the elongated member at the end of the hollow tube 10.

[0068] The embodiments shown in figures 24 and 25 may also be provided with a snap-open safety feature wherein the hollow tube 10 is provided with a fracture line positioned at the sealing portion of the elongated member. The end of the hollow tube 10 with the protruding elongated member is affixed to the elongated member. In this configuration, the elongated member cannot be pulled away from the hollow tube 10 by accident. The elongated tubular housing 1 must first be bent at the fracture line on the hollow tube 10 to separate the hollow tube 10 and the elongated member at the fracture line. The elongated member may then be pulled away from the hollow tube 10 to expose a fluid flow path and to allow the fluid 3 to be released through the fluid flow path.

[0069] Figure 26 shows another embodiment of the container with push-pull opening means. In this embodiment, the sealing plug 40 is an elongated member with a profile such that when the elongated member is inserted at a restriction 42 in the elongated tubular housing 1 it will not seal

the fluid flow path from the fluid 3 through the restriction 42. The profile may be a square, triangular, or any other geometric profile other than a circle with approximately the same diameter as the inside diameter of the restriction 42. One end of the elongated member has a sealing profile with approximately the same outside diameter as the inside diameter of the restriction 42. The elongated member is inserted with the end with the sealing profile and a short length of the elongated member inside the restriction 42. A length of the elongated member extends outside of the restriction 42 such that it may be grasped by squeezing the elongated tubular housing 1 at the position of the elongated member that extends outside of the restriction 42 thereby affix the position of the elongated member relative to the elongated tubular housing 1. The elongated member may be urged to move through the restriction 42 by compressing the elongated tubular housing 1 on either side of the bellow section 2. When the end of the elongated member with the sealing profile is pushed out of the restriction 42, a fluid flow path is exposed to allow the fluid 3 to be release from the elongated tubular housing 1. The elongated member will be retained at the restriction 42.

[0070] Figure 27 shows a variation of the container with push-pull opening means shown in figure 26. In this embodiment, an opening 44 is provided on the cylindrical wall of a hollow tube 43 on the side of the end of the elongated member with the sealing profile opposite the fluid 3. The hollow tube 43 has a smaller outside diameter than the inside diameter of the elongated tubular housing 1 and is sealed against the elongated tubular housing 1 at the end of the hollow tube 43 with the protruding elongated member. When the elongated tubular housing 1 is compressed, the end of the elongated member with the sealing profile will slide past the opening 44 in the cylindrical wall of the hollow tube 43 and expose a fluid flow path from the fluid 3 through the side of the elongated member, through the opening 44 in the cylindrical wall of the

hollow tube 43, through the space between the outside wall of the hollow tube 43 and the inside wall of the elongated tubular housing 1, and out to the applicator tip 5.

[0071] Figure 28 shows a variation of the container with push-pull opening means shown in figure 27. In this embodiment, the end of the hollow tube 45 opposite the protruding elongated member is sealed thereby limiting the travel of the elongated member past the opening 46 in the cylindrical wall of the hollow tube 45.

[0072] Figure 29 shows another embodiment of the container with push-pull opening means shown in figure 28. In this embodiment, the hollow tube 47 that is affixed at the end of the elongated tubular housing 1 has a sealed end positioned inside the elongated tubular housing 1. An elongated member 40 as shown and described in reference to figures 24 through 28 is inserted with the end with the sealing profile into the hollow tube 47 and affixed to the sealed end of the hollow tube 47. A snap-open safety feature in the form of a fracture line 48 is provided on the hollow tube 47 at the position of the end of the elongated member 40 with the sealing profile. The elongated member 40 cannot be pulled away from the hollow tube 47 by accident. The elongated tubular housing 1 must first be bent at the fracture line 48 on the hollow tube 47 to separate the hollow tube 47 and the elongated member 40 at the fracture line 48. The elongated member 40 may then be pulled away from the hollow tube 47 to expose a fluid flow path and to allow the fluid 3 to be released through the fluid flow path.

[0073] Figure 30 shows another application of the embodiment of the container with push-pull opening means shown in figure 29. The structure shown in figure 29 is inverted and affixed within the elongated tubular housing 1 with the outside diameter of the open end of the hollow tube 49 sealing against the inside wall of the elongated tubular housing 1 to seal the fluid 3 within the elongated tubular housing 1. When the elongated tubular housing 1 is bent at the

fracture line **50**, the hollow tube **49** will be separated from the elongated member **40** and the elongated member **40** may then be partially pulled out of the hollow tube **49**. When the non-sealing end **41** of the elongated member **40** is exposed outside of the hollow tube **49**, a fluid flow path is exposed to allow the fluid **3** to be released from the elongated tubular housing **1**. The non-sealing end **41** will remain in the hollow tube **49** thereby retain the elongated member **40** at the end of the hollow tube **49**.

[0074] Figure 31 shows another variation of the embodiment of the container with push-pull opening means shown in figure 30. In this embodiment, the elongated member **51** extends a substantial length out of the open end of the hollow tube **49**. After the elongated tubular housing **1** is bent at the fracture line **50** to separate the hollow tube **49** into two sections, the elongated tubular housing **1** may then be compressed at the bellow section **2**, pushing the non-sealing end **52** of the elongated member **51** into the hollow tube **49**. The sealing end of the elongated member **51** will urge the sealed end of the hollow tube **49** to separate from the remainder of the hollow tube **49** thereby exposing a fluid flow path around the elongated member **51**, through the hollow tube **49**, exit the hollow tube **49** at the fracture **50**, and into the applicator tip **5**.

[0075] Figure 32 shows another embodiment of the container with push-pull opening means. In this embodiment, a hollow tube **53** with a sealed end is affixed to the end of the elongated tubular housing **1** with the sealed end inside the elongated tubular housing **1**. A plug **54** with a shorter length than the hollow tube **53** is affixed to the sealed end of the hollow tube **53** inside the hollow tube **53**. An opening **55** is provided on the cylindrical wall of the hollow tube **53** at a position along the length of the plug **54** inside the hollow tube **53**. A fracture line **56** is formed on the hollow tube **53** below the opening **55** at a position along the length of the plug **54** inside the hollow tube **53**. When the elongated tubular housing **1** is bent near the fracture line **56** on the

hollow tube 53, the hollow tube 53 will be separated into two sections. The section with the plug 54 attached may then be pulled out of the remainder of the hollow tube 53 to open a fluid flow path through the opening 55 in the cylindrical wall of the hollow tube 53 by stretching the elongated tubular housing 1 at the bellow section 2.

[0076] Figure 33 shows another embodiment of the container with push-pull opening means. In this embodiment, the hollow tube 4 with a sealed end is inserted into the elongated tubular housing 1 with its sealed end inside the elongated tubular housing 1 extending into a restriction 57 in the elongated tubular housing 1. An opening 6 is provided in the cylindrical wall of the hollow tube 4 near the sealed end positioned inside and sealed by the restriction 57. The seal end of the hollow tube 4 is further provided with a protrusion 58 extending away from the sealed end with a profile such that when that protrusion 58 is inserted into the restriction 57 in the elongated tubular housing 1 it will not seal the fluid flow path from the fluid 3 through the restriction 57. The protrusion 58 may have a square, triangular, or any other geometric profile other than a circle with approximately the same diameter as the inside diameter of the restriction 57. In this embodiment, when the elongated tubular housing 1 is stretched at the bellow section 2, the hollow tube 4 will be pulled away from the restriction 57. When the opening 6 in the cylindrical wall of the hollow tube 4 is exposed outside of the restriction 57, a fluid flow path will be opened. The fluid 3 may then be released through the opening between the protrusion 58 and the restriction 57, out of the restriction 57, into the opening 6 in the cylindrical wall of the hollow tube 4, and out of the hollow tube 4.

[0077] The restriction 57 in the elongated tubular housing 1 may be in the form of a sealing plug. The sealing plug may be affixed to the wall of the elongated tubular housing 1 and provided with fluid flow path from one side of the sealing plug to the other side such as that

shown in figure 8. The hollow tube 4 shown in figure 33 may also be sealed and affixed to the sealing plug at a location between the opening 6 in the cylindrical wall of the hollow tube 4 and the open end of the hollow tube 4 with the opening 6 disposed within the sealing plug. A fracture line is provided on the circumference of the sealing plug at a position between the opening 6 and where the hollow tube 4 is sealed and affixed to the sealing plug. With this embodiment, the sealing plug must first be separated into two sections at the fracture line by bending the elongated tubular housing 1 at the location of the fracture line before the hollow tube 4 maybe pulled out of the sealing plug by stretching the elongated tubular housing 1 at the bellow section 2.

[0078] Figure 34 shows another embodiment of the container with push-pull opening means. In this embodiment, a first hollow tube 59 with a thru bore and an outside dimension at one end 60 that is smaller than the inside diameter of a second hollow tube 61 with a sealed end is inserted into and affixed with the smaller end 60 to the sealed end of the second hollow tube 61. A fracture line 62 is provided around the circumference at the smaller end 60. After the elongated tubular housing 1 is bent at the location of the fracture line 62, the two hollow tubes 59, 61 may be pulled apart by stretching the elongated tubular housing 1 at the bellow section 2. When the smaller end 60 of the first hollow tube 59 is revealed outside of the second hollow tube 61, a fluid flow path is opened through the thru bore in the first hollow tube 59.

[0079] If the first hollow tube 59 is not affixed to the second hollow tube 61, the first hollow tube 59 must have a sealing outside diameter approximately that of the inside diameter of the second hollow tube 61 such that when it is inserted into the second hollow tube 61, it will seal the fluid flow path between the two hollow tubes 59, 61. The two hollow tubes 59, 61 may be pulled apart by stretching the elongated tubular housing 1 at the bellow section 2. When the

smaller end **60** of the first hollow tube **59** is revealed outside of the second hollow tube **61**, a fluid flow path is opened through the thru bore in the first hollow tube **59**. In a variation of this embodiment, the first hollow tube **59** may be sealed against and affixed to the second hollow tube **61** near the open end of the second hollow tube **61** and provided with a fracture line on the second hollow tube **61** between the open end of the second hollow tube **61** and the smaller end **60** of the first hollow tube **59**. In this variation, after the two hollow tubes **59, 61** are separated at the fracture line, the sealed end of the second hollow tube **61** may be pulled away from the first hollow tube **59** to open a fluid flow path.

[0080] Figure 35 shows another embodiment of the container with push-pull opening means. In this embodiment, an elongated member **63** is inserted into a restriction **64** inside the elongated tubular housing **1** and extends toward the open end of the elongated tubular housing **1**. When one squeezes the elongated tubular housing **1** at the position of the elongated member **63** and grasps both the elongated tubular housing **1** and the elongated member **63**, the elongated member **63** may be pulled away from the restriction **64** in the elongated tubular housing **1** by stretching the elongated tubular housing **1** at the bellow section **2** and open a fluid flow path through the restriction **64** in the elongated tubular housing **1**.

[0081] Figure 36 shows another embodiment of the container with push-pull opening means. In this embodiment, two restrictions **64, 67** are provided inside the elongated tubular housing **1** with one on either side of the bellow section **2**. The restriction **67** near the open end of the elongated tubular housing **1** is provided with one or more fluid flow paths **68** through it such as that shown in figure 8. A hollow tube **65** with a sealed end is inserted with its open end towards the sealed end of the elongated tubular housing **1** through both of the restrictions **64, 67** in the elongated tubular housing **1** and is affixed to the restriction **67** near the open end of the elongated

tubular housing 1. An opening 66 is formed in the cylindrical wall of the hollow tube 65 near the open end of the hollow tube 65 and positioned at the restriction 64 such that the restriction 64 will seal the opening 66 in the hollow tube 65. When the elongated tubular housing 1 is stretched at the bellow section 2, the hollow tube 65 will be pulled away from the restriction 64 near the sealed end of the elongated tubular housing 1 opening a fluid flow path. The fluid 3 may then be released through the open end of the hollow tube 65, through the opening 66 in the hollow tube 65, through the fluid flow path 68 through the restriction 67 near the open end of the elongated tubular housing 1, and into the applicator tip 5.

[0082] Figure 37 shows a variation of the container with push-pull opening means shown in figure 36. In this embodiment, the opening 66 in the hollow tube 65 is positioned between the two restrictions 64, 69 in the elongated tubular housing 1 and no fluid flow path is provided through the restriction 69 near the open end of the elongated tubular housing 1. When the elongated tubular housing 1 is stretched such that the sealed end of the hollow tube 65 passes the restriction 69 near the open end of the elongated tubular housing 1, a fluid flow path is opened to release the fluid 3. The fluid 3 is released through the open end of the hollow tube 65, out of the opening 66 in the hollow tube 65, and out of the open end of the elongated tubular housing 1.

[0083] Figure 38 shows another embodiment of the container with push-pull opening means. In this embodiment, two restrictions 64, 67 are provided inside the elongated tubular housing 1 with one on either side of the bellow section 2. The restriction 67 near the sealed end of the elongated tubular housing 1 is provided with one or more fluid flow paths 68 through it such as that shown in figure 8. A hollow tube 65 with a sealed end is inserted with its open end towards the sealed end of the elongated tubular housing 1 through both of the restrictions 64, 67 in the elongated tubular housing 1. An opening 66 is formed in the cylindrical wall of the hollow tube

65 and positioned between the restriction 64 near the open end of the elongated tubular housing 1 and the open end of the elongated tubular housing 1. A plug 70 in the form of a short section of a tube with a sealed end is placed over the open end of the hollow tube 65 sealing the open end. The plug 70 is affixed to the restriction 67 near the sealed end of the elongated tubular housing 1. When the elongated tubular housing 1 is stretched at the bellow section 2, the plug 70 will be pulled away from the hollow tube 65 thereby opening a fluid flow path. The fluid 3 may then be released through the open end of the hollow tube 65, through the opening 66 in the hollow tube 65, and into the applicator tip 5.

[0084] A variation of the container with push-pull opening means shown in figure 38 affixes the open end of the plug 70 to the outside wall of the hollow tube 65 with a fracture line 71 provided between where the plug 70 is affixed to the hollow tube 65 and the sealed end of the plug 70. In this embodiment, when the fracture line 71 is broken open by bending the elongated tubular housing 1, the plug 70 may be separated from the open end of the hollow tube 65 by stretching the elongated tubular housing 1 at the bellow section 2. Without fracturing the fracture line 71, the plug 70 cannot be removed.

[0085] Figure 39 shows another embodiment of the container with push-pull opening means. In this embodiment, two restrictions 64, 67 are provided inside the elongated tubular housing 1 with one on either side of the bellow section 2. The restriction 67 near the sealed end of the elongated tubular housing 1 is provided with one or more fluid flow paths 68 through it such as that shown in figure 8. A hollow tube 65 with a sealed end is inserted with its open end towards the sealed end of the elongated tubular housing 1 through both of the restrictions 64, 67 in the elongated tubular housing 1. An opening 66 is formed in the cylindrical wall of the hollow tube 65 and positioned between the restriction 64 near the open end of the elongated tubular housing 1

and the open end of the elongated tubular housing 1. A plug 72 in the form of a short section of a tube with a sealed end and a protrusion 73 inside the plug 72 at the sealed end is placed over the open end of the hollow tube 65 sealing the open end. The protrusion 73 has approximately the same outside diameter as the inside diameter of the hollow tube 65 and ends with a section 74 that has a smaller profile than the inside diameter of the hollow tube 65. The plug 72 is affixed to the restriction 67 near the sealed end of the elongated tubular housing 1. When the elongated tubular housing 1 is stretched at the bellow section 2, the plug 72 will be pulled away from the hollow tube 65 thereby opening a fluid flow path. The fluid 3 may then be released through the open end of the hollow tube 65, through the opening 66 in the hollow tube 65, and into the applicator tip 5.

[0086] A variation of the container with push-pull opening means shown in figure 39 affixes the open end of the plug 72 to the outside wall of the hollow tube 65 with a fracture line 75 provided between where the plug 72 is affixed to the hollow tube 65 and the sealed end of the plug 72. In this embodiment, when the fracture line 75 is broken open by bending the elongated tubular housing 1, the plug 72 may be separated from the open end of the hollow tube 65 by stretching the elongated tubular housing 1 at the bellow section 2. Without fracturing the fracture line 75, the plug 72 cannot be removed.

[0087] Although the invention has been described in terms of particular embodiments and applications, one of ordinary skill in the art, in light of this teaching, can generate additional embodiments and modifications without departing from the spirit of or exceeding the scope of the claimed invention. Accordingly, it is to be understood that the drawings and descriptions herein are proffered by way of example to facilitate comprehension of the invention and should not be construed to limit the scope thereof.